



From large-scale climate change to socio-economic losses: The case of hurricanes in the U.S.

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Abstract:

This paper presents a method to assess how climate change could translate into economic losses through the modelling of the different mechanisms that need to be taken into account. In this presentation, we start from a 10 percent increase in hurricane potential intensity, and we follow the causal chain from this large-scale change to total economic losses. To do so, this large-scale change is downscaled to a small spatial scale, pertinent to investigate socio-economic impacts. This downscaling is carried out using the Emanuel's hurricane model, which provides the annual probability of landfall of hurricanes from different categories of the Saffir-Simpson scale, in each region of the U.S. Atlantic and Gulf coast. As an example, the annual probability of category-5 landfall over the U.S. coastline is found to increase from 7 to 21 percent in response to the potential intensity increase. These landfall probabilities are of the foremost importance for urban planners and infrastructure designers. Other actors, however, are interested in different information. Insurers, for instance, needs these probabilities to be transformed into possible changes in the direct losses caused by hurricanes. Here, this transformation is carried out using a simple statistical analysis of past landfalls and the corresponding losses, and this analysis suggests that, if vulnerability remains unchanged, average annual losses could increase by 54 percent, from 8 billion to 12 billion a year. Of course, adaptation strategies could be undertaken to limit these losses and several strategies to do so are discussed. Finally, many economic mechanisms enter into action to reduce or amplify direct losses: propagation between economic sectors, production losses during the reconstruction period, macroeconomic feedbacks, etc. These indirect effects are investigated using a modified Input-Output model (ARIO), which provide an estimate of how the initial change in large-scale condition causes welfare losses. The model suggests that total economic losses increase like the square of direct losses, amplifying the role of the most extreme events. For instance, in Louisiana, total losses are twice as large as direct losses when the latter exceed \$ 200 billion. Again, we discuss several adaptation strategies that can reduce indirect losses by improving the ability of the economy to reconstruct and deal with the disaster consequences.

Source:

<http://abstractsearch.agu.org/meetings/2007/FM/sections/GC/sessions/GC31A/abstracts/GC31A-0104.html>

Resource Description

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Exposure :

weather or climate related pathway by which climate change affects health

Extreme Weather Event

Extreme Weather Event: Hurricanes/Cyclones

Geographic Feature:

resource focuses on specific type of geography

Ocean/Coastal, Urban

Geographic Location:

resource focuses on specific location

United States

Health Impact:

specification of health effect or disease related to climate change exposure

Health Outcome Unspecified

Mitigation/Adaptation:

mitigation or adaptation strategy is a focus of resource

Adaptation

Model/Methodology:

type of model used or methodology development is a focus of resource

Cost/Economic, Exposure Change Prediction

Population of Concern: A focus of content

Population of Concern:

populations at particular risk or vulnerability to climate change impacts

Low Socioeconomic Status

Resource Type:

format or standard characteristic of resource

Research Article

Timescale:

time period studied

Time Scale Unspecified

Vulnerability/Impact Assessment:

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

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